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EFFECTS OF CERTAIN REWARDS FOR TASK PERFORMANCE AMONG LOWER-CLASS BOYS.

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IT WAS HYPOTHESIZED THAT DUE TO THE REAL OR IMAGINARY MENTAL DEPRIVATION OF THE LOWER-CLASS CHILD, TANGIBLE REWARDS WOULD BE MORE REASSURING TO HIM AND WOULD INVOLVE HIM IN CONCEPTUAL TASKS MORE THAN WOULD THE INTANGIBLE REWARDS OF THE SORT OFFERED IN MIDDLE-CLASS SCHOOLS. THESE FOUR KINDS OF CONCEPTUAL BEHAVIOR--(1) CONCEPT SWITCHING, (2) CONCEPT ATTAINMENT, (3) CONCEPT VERBALIZATION, AND (4) DECISION TIME--WERE TESTS. THE SAMPLE GROUP, CONSISTING OF 24 SUBJECTS IN EACH OF THREE AGE GROUPS (FOUR, FIVE, AND SIX) APPROXIMATELY NINE MONTHS APART, WERE CAUCASIAN CHILDREN ATTENDING HEAD START PRE-SCHOOL TRAINING CENTERS. THE RESULTS SHOW THAT THE TANGIBLE-INTANGIBLE DIMENSION HAD NO EFFECT ON THE FOUR KINDS OF CONCEPTUAL BEHAVIOR. THE CAUSES OF THE FAILURE OF THIS STUDY TO CONFIRM CERTAIN EARLIER STUDIES ARE DISCUSSED. (CG)

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Effects of Certain Rewards for Task Performance Among Lower-Class Boys

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The observation that lower-class children appear to be more influenced by tangible rewards than by intangible rewards when engaged in problem solving has been reported by Davis (1948), Zigler and de Labry (1962), and Terrell, Durkin, & Wiesley (1959). Davis (1948), Douvan (1956), and Erickson (1947) have argued that the emphasis on being "right" has predominated in middle-class child-rearing practices and that this and other intangible reinforcers are most frequently paired with other primary and secondary reinforcers in the middle-class home than in lower-class homes.

Problem

The specific objective of this study was to determine how tangible and intangible rewards affect conceptual thinking in lower-class boys of the age range from 5 to 6 1/2 years. The study[1] was an extension of Cernius' study (1966) which was an elaboration of the Zigler and de Labry experiment (1962).

Zigler and de Labry conducted their experiment with three groups of 22 children: a retarded, a lower-class, and a middle-class group. The groups were matched on mental age (mean M.A. = 6.9), using the Stanford-Binet (L) for retardates and the Goodenough Draw-A-Man for normals. The

mean I.Q.'s of the two normal social class groups were between 108 and 112. The Kounin (1941) concept-switching task (classification of cards on the basis of color and shape) was used as the conceptual task. Half of each group (11 subjects) worked under intangible reinforcement ("right" and "wrong"); the other half worked under tangible reinforcement (chips to be cashed in for toys). Zigler and de Labry reported that "in the intangible reinforcement condition, the performance of middle-class children on the concept-switching task was superior to that of both the lower-class and retarded children. However, this superiority vanished when a comparison was made of the performance of the three types of subjects, when each type received its own optimal reinforcer i.e., the intangible reinforcer for middle-class and the tangible reinforcer for retarded and lower-class children."

We hypothesized in the present study that, due to real or imaginary material deprivation of the lower-class child, tangible rewards would be more reassuring to him and would involve him in conceptual tasks more than would the intangible rewards of the sort offered in (middle-class) schools. Specifically, the following hypotheses were investigated.

First, concept attainment and concept shifting would be more successful at all three age levels under tangible reward conditions than under intangible conditions.

Second, we hypothesized that with increasing age an increasing number of abstract principles would be used for classification, as verbalized by S in the inquiry portion of the multiple concept attainment task. We regard a concept as a selective system in mental organization which links

previous experience and current mental states with stimulus objects. Perception, abstraction, and generalization are seen as parts of this process, and language is viewed as facilitating it. With increasing age, the number of perceptions and thus the number of possible interrelations increases, as does language facility. Language is viewed as the most important mechanism of abstraction and generalization (Bruner, 1964).

Third, we hypothesized that, by virtue of the greater language facility with increasing age, a differential effect of reward conditions for different ages would appear in our data. In the ages from five to six and one-half we expected that language development would facilitate the reward function of words, i.e., would facilitate the effectiveness of intangible reinforcers. Therefore, the differential effect of tangible and intangible rewards was expected to decrease, but to be still substantial among six and one-half year-olds.

And fourth, we hypothesized a longer decision time under tangible than under intangible conditions and a differential (decreasing) effect of treatment over the age span sampled. We reasoned that responsiveness to tangibility of reinforcement and unresponsiveness to intangibility of reinforcement would be positively related to a tendency toward action and toward quick closure. Action, we assumed, was a more tangible (i.e., immediate) response to the kinds of demands inherent in our two tasks than was thought. We therefore reasoned that if a tangible reward were provided, the need for quick closure would be reduced and therefore decision times would be longer in the tangibly reinforced group.

To summarize, our research purpose and hypotheses called for a design that would allow assessments of the effects of the experimental

variable (tangibility-intangibility of reinforcement) and of age on conceptual behavior of four kinds. The four major dependent variables were concept switching, block sorting, verbalizations of underlying rules or principles for sorting, and decision time in block sorting. Translated into statistical terms, our hypotheses state that we expected main effects of reward condition on all of these dependent variables and a main effect of age on abstractness of verbalization. Our third hypothesis states that we expected a differential effect, as well as a main effect on all four kinds of dependent variable.

Method

Subjects. We wanted to assess the differential impact of the two different kinds of reward in the early age range of pre-schoolers during which, as Bruner (1964), Vygotsky (1962), and Kendler (1963) have shown, a shift in representational processes takes place. Caucasian children attending Head Start pre-school training centers from three predominantly blue-collar communities were selected randomly within three age ranges as close to 4, 5, and 6 years as possible. The available pool of subjects did not conform perfectly with these specifications, especially in the four year old range. The final sample included 24 subjects in each of three age groups approximately nine months apart. The means (and standard deviations) of the ages were 57.3 months (1.6), 65.1 months (3.4), and 76.4 months (3.2). The Lorge-Thorndike Intelligence Test (level 1, non-verbal) was used as a rough screening device to ensure equivalence of experimental groups and to eliminate subjects below the arbitrary IQ cut-off point of 85. Children below this point were expected to provide too little variance on the KCST

and the MCAT. The means and standard deviations of mental age fr the groups are presented in Table 1.

Table 1

Means and Standard Deviations of Mental Age

Age in Months[a]	N		Tangible	Intangible
57	24	M	56.3	56.2
		SD	4.9	5.1
65	24	M	62.2	66.2
		SD	7.6	8.2
76	24	M	77.8	78.9
		SD	7.7	6.8

[a]The three age groups are referred to in the text as the five-year-old, five and a half-year-old, and six and a half-year-old groups, respectively.

Head Start children were drawn from families who could qualify for the pre-school program only if their annual income did not exceed $3,000 for a family with three children plus $500 for each additional child. In addition, only families from housing areas designated as depressed were eligible. Such eligibility was taken as evidence of subjects' lower socio-economic class if occupational status of the parent indicated on the child's application was the equivalent of a 6 or 7 on the occupational scale of Warner, Meeker & Eells (1949).

Because two different conceptual tasks were to be used, a counterbalanced order of presentation was employed for subjects in each age-reward group: six subjects received the Kounin (1941) concept switching task (KCST) first and the Multiple Concept Attainment Task (MCAT) second while the other six subject received the tasks in reverse order. Assignment to both treatment and order of presentation was random.

The Kounin Task (KCST). The KCST was the same task used by Kounin (1941), by Zigler and de Labry (1962), and by Cernius (1966). It consists of two pre-experimental tasks and an experimental task. The experimental task employed stimuli that could be grouped on the basis of either color or form. The two pre-experimental tasks were used to give subjects experience with two principles of classification, a color grouping and a form grouping. The pre-experimental color task contained 25 3½"x 3½" square colored cards which were presented to each subject with the request that he classify them into five groupings. Five cards of each of the following colors were used: black, yellow, pink, green, and red. Instructions for this and subsequent tasks were the same as those used by Kounin and by Zigler and de Labry and described in detail by Cernius (1966). The pre-experimental form task consisted of 25 white cards, five of each of the following shapes: triangle, square, circle, cross, and five-pointed star. The 25 cards were shuffled and handed to the subject who was then asked to "find some things that are the same and belong together and put them on one sheet of paper. Then find some others that are the same and put them on another sheet of paper and keep on going until you have all those that are the same together."

The experimental task also consisted of 25 cards but the experimental cards varied in both shape and color. Each shape appeared in five colors,

each color in five shapes. The experimental task had two parts. The instructions for the first part were identical to those for the pre-experimental tasks. Once the subject had sorted on the basis of either form or color the experimental cards were removed and re-shuffled. They were returned to the subject in order to start phase 2 of the experimental task. Phase 2 required the subject to sort the cards again into five piles but this time the subject was asked to "put them together some other way", i.e., to switch concepts.

Observations from the Kounin task yielded both qualitative and quantitative scores. The qualitative scores were judgements of whether the child (1) rejected the task, i.e., was unable either to sort both pre-experimental cards or was unable to sort experimental cards in any way (2) was able to sort experimental cards on a first sort but was unable to switch to a second principle for sorting and (3) succeeded in switching concepts. Subjects were given seven trials of sorting in phase 2 of the experimental task. If they succeeded on any of these trials they were counted as having switched concepts. The quantitative score yielded by these observations was simply the number of trials to switch concepts. All subjects who tried the second phase of the experimental task but who failed were assigned arbitrarily a score of eight.

The Multiple Concept Attainment Task (MCAT). The MCAT presents the child with three groups of blocks ("criterion" groups), four blocks in each group, with the groups separated from each other by about eight inches in a triangular pattern on an 18" X 26" stimulus board. The triangular pattern is slightly offset to the left of the board, leaving room for a fourth "group" of blocks to the right of the two groups situated

at the corners of the base of the triangle nearest the subject. When the subject is first seated before the stimulus board (lying flat on a desk or table), he sees immediately before him a 2-inch square grey spot on the board with the three groups of blocks in their triangular pattern slightly behind the grey spot. To the right of the three primary criterion groups of blocks is a place for a fourth "group" of blocks, the null set, which has not yet been placed on the board. The four blocks in the criterion group immediately to the right of the grey spot are all cylinders, the blocks in the criterion group immediately behind the spot are all tall, and the blocks in the criterion group to the left of the spot are all yellow. The blocks in any one group are mutually exclusive from the other groups. That is, there are no yellow cylinders, tall cylinders, or tall yellow blocks.

The blocks in the three criterion groups, as well as all placement blocks, described below, are drawn from a larger set of 225 blocks generated by the dimensions of color, shape, height, and base area. In the set there are five colors (white, yellow, red, green, and blue), five shapes of the tops of blocks (circle, triangle, square, half-circle, and trapezoid), three heights (5/8", 1 1/8", and 1 5/8"), and three base areas, which varied depending upon the shape but which were determined by three basic stock sizes of 5/8", 1 1/8", and 1 5/8". Blocks of the 5/8-inch base area were not used in the present study. All values of all other dimensions except the base area were employed in the task, with base area as a two-valued, irrelevant dimension.

After being told that "the blocks in any one group are all exactly alike in some way," and that his task was to show the experimenter what

made the blocks in any one group the same, the subject was told:

> I will take another block, like these, and will put it here on this spot. You are to think about which group that block is most like -- which group that block belongs with. As soon as you see which group that block belongs with you should pick up the block and put it <u>in front</u> of the group. For example, if I put a block here (indicate spot) and you think it belongs with this group of blocks (indicate tall blocks, behind spot), then you would put the block here, in front (point to board in front of group of tall blocks). Sometimes you will be right, (name), and sometimes you will be wrong. When you are right, I'll tell you and we'll put the block with the group like this (cup hand and move imaginary block in front of tall blocks closer to the group). When you are wrong, I will tell you, and we'll put the block <u>behind</u> the group to show that it does not go with that group (indicate with an imaginary block).
>
> Now sometimes, (name), the block that I put out there on the spot will <u>not</u> belong <u>with</u> <u>any</u> of these three groups. When you see a block that does not go with any of these three groups, I want you to put it over here (put insert for group #4 in place) in front

of <u>these</u> blocks. These blocks have been put here because none of them belongs with any of these three groups.

From time to time, (name), I will ask you why these (indicate cylinders) are all the same, why these (tall) are all the same and why these (yellow) are all the same. Just because I ask you several times does not mean that you have given a wrong answer. I will ask you again just to see if you have changed your mind or found a new answer.

The two younger groups of subjects were given a somewhat abbreviated version of these instructions, with information about incorrect placements and the verbal inquiry supplied by E at appropriate points during the procedure rather than at the outset. We had found that attention waned with the younger children with lengthy verbal instructions, but we used the longer version with the oldest group so that conditions would be comparable with the first-grade group employed in Cernius' (1966) dissertation study.

Once instructions were completed, the stimulus board held all four criterion groups, representing the concepts of shape, height, color, and null or non-member set. From a set of 40 placement blocks hidden from S's sight, blocks were presented to the child one at a time in a sequence that was so ordered that every four blocks represented each of the four criterion groups. Within each of these four-block sets, the order was randomized. Each placement block was placed by E on the grey spot; simultaneous with its presentation on the grey spot a stop watch was started. As soon as

the child had placed the block in front of one of the four criterion groups, the stop watch was stopped. The time interval between the offering of the placement block by E and its actual placement by S was the decision time for that placement. The 40-block series contained ten blocks from each of the four criterion groups.

After every eight block placements the child was asked, "What makes these blocks all alike (all the same)?" The question was asked with reference to each of the three primary criterion groups. Responses were written down verbatim with no feedback given.

There were thus three kinds of data provided by MCAT: placement accuracy, decision time, and verbal responses. Verbal responses were categorized into one of four mutually exclusive categories and a score for each of these four categories was computed for each of the three positive concepts in the task. A response could be either correct or incorrect and the correct responses were categorized in three separate ways. (1) They were called abstract if the dimension of the concept was labeled i.e., shape, height, color. Any response was categorized as abstract if any part of it was abstract. (2) They were categorized as concrete if the value of the dimension of the concept was named, i.e., round, big or tall, yellow. (3) They were categorized as correct and mixed if either the correct dimension or the correct value of the dimension was named and other incorrect dimensions or values were added to the response, e.g., "they're all round and square and have edges." The fourth category of response was one in which descriptions that were correct for one part of the task were used to describe incorrectly the blocks in another part of the task. For example, while looking at the

yellow blocks and responding to the inquiry a child might respond, "they're all the same shape, they're all triangles;" or, while looking at the yellow blocks might respond, "The same shapes." All other incorrect responses were left uncategorized and did not enter the score. There were, thus, four verbal scores each of which, with five inquiries, could range from zero to five.

Reward Procedures. In the intangible reward situation, the experimenter said "right" or "that's correct" after every correct sorting (KCST) and after every correct placement of a block (MCAT). He said "wrong" (or "no, that's not right"), after every incorrect sorting and block placement. In the tangible reward situation, the subject was initially brought to a table on which five reward objects were arranged. A model car, a ball point pen, a soldier figure, a chocolate bar and a dime were shown to the subject and it was explained that he might win one of them if he did well in the games he was about to play. The child was then seated, the reward objects remaining in his field of vision about five feet away from him. After every correct sorting (KCST) and block placement (MCAT), the experimenter said "right" and gave the subject a large steel washer which he was told could be exchanged for one of the reward objects. After every incorrect sorting or placement the experimenter said "wrong" or "no, that's not right" and did not give the subject a washer. The washers were about the size of a half dollar and weighed about the same. The "tangible" reward condition, then, included both verbal and material reinforcement; i.e., both "right" or "wrong" and the washer.

After the experimental session, subjects in the tangible reward condition were asked to choose one of the five reward objects in exchange

for their steel washers. The child was asked to leave his reward object in the room since it had to be used for other children. He was promised that an identical object was to be purchased and that he would be given his reward in a few days. After a few days, the experimenter gave all subjects their chosen rewards. After completion of testing in a given school, subjects in the intangible condition were also given their choice of rewards.

Results

Hypothesis 1. The first hypothesis called for comparison of the tangible group with the intangible group with respect to their scores on the MCAT and the Kounin task. A test of this hypothesis, however, assumes that there is sufficient behavior of the kind expected, namely, some success on the concept attainment task and in concept switching, that a differentiation in data analysis can be made between the tangible and intangible groups. As it happened, the Kounin concept switching task was apparently too difficult for the two youngest groups of children. Table 2 presents the relevant data. Only six children from the two youngest groups succeeded in switching. These cases provided insufficient data to test whether tangibility and intangibility of reward were differentially effective. A direct test of the hypothesis was made with the data provided by the 24 six and one-half-year-olds, however. The chi square (with Yates' correction) resulting from a test of effects of tangibility-intangibility on success in switching was not statistically significant ($X_c^2 = .67$). Thus, for the Kounin task, the first hypothesis must be rejected: the presumed optimal reinforcement for this group of subjects was not more effective than

the non-optimal reinforcement. Table 2 does show a considerable shift between the 5.5-year level and the 6.5-year level in ability to succeed on this concept switching task. Chi square for data in Table 2 was 22.79 (4 df; $p < .001$), indicating a strong effect of age on concept switching behavior in this relatively narrow age span.

Table 2

Kounin Task Performance of the Three Age Groups

Age in Months	Rejected Task	Tried, Failed	Succeeded in Switch
57	16	6	2
65	10	10	4
76	3	8	13

$X^2 = 22.79$; df, 4: $p < .001$

Data from the MCAT also provided no support for the hypothesis that tangibility of reward would affect concept attainment. Analysis of placement accuracy variance showed no treatment affects for the four parts of the conceptual task (shape, height, color and the null concept). As Table 3 shows, the levels of success achieved by these children in the four parts of the MCAT were sufficient to show an effect of the reward conditions if indeed the reward conditions had any affect at all. One might argue that the yellow concept was too easy for these children and therefore that the effect of reward conditions would be minimal. However, the same line of

argument would not hold for the cylinder task which showed significant ($p < .01$) improvement from the 5-year-old group to the 6.5-year-old group.

Table 3

Means and Standard Deviations of Placement Accuracy

Age in Months	N	Shape		Height		Color		Null	
		Tangible	Intangible	Tangible	Intangible	Tangible	Intangible	Tangible	Intangible
57	M	.68	.60	.38	.39	.88	.85	.22	.20
	24 SD	.27	.29	.21	.33	.19	.28	.14	.25
65	M	.64	.78	.35	.32	.69	.88	.35	.23
	24 SD	.30	.21	.12	.24	.30	.16	.16	.16
76	M	.88	.94	.52	.46	.72	.75	.28	.29
	24 SD	.20	.10	.25	.18	.23	.28	.18	.17

Hypothesis 2. Verbalization data were gathered from the MCAT only. A test of the second hypothesis called for a simple analysis of variance of the correct and abstract verbalization scores. However, the responses obtained in this age range did not, except in one or two instances, fit into our abstract category. Therefore the hypothesis could not be tested in its strictest sense. If we assume that there is a developmental progression from no verbalization, to concrete verbalization, to abstract verbalization, then we might test the hypothesis at the level of correct but concrete verbalization. An analysis of variance of the number of correct but concrete responses was carried out for the shape concept only.

Verbalization on the other concepts was so frequently of the unscoreable or "don't know" kind that no differentiation was possible among the age-treatment groupings. The analysis of correct but concrete verbalizations regarding the shape concept revealed a stable ($F = 12.09$, $df = 2, 66$; $p < .001$) and steadily increasing trend with age. Thus, the second hypothesis is supported in part by these data; strictly speaking, it was untestable from the evidence of this study.

Hypothesis 3. The third hypothesis extends the first hypothesis. In addition to the main effect of treatment, we expected an interaction effect of treatment with age on conceptual behavior studied in these two test situations. For reasons already discussed, the age-by-treatment

Table 4

Means and Standard Deviations of Decision Times (Log_{10})

Age In Months	N	Shape		Height		Color		Null	
		Tangible	Intangible	Tangible	Intangible	Tangible	Intangible	Tangible	Intangible
57	M 24	.64	.69	.74	.72	.61	.56	.71	.71
	SD	.13	.19	.14	.20	.13	.20	.15	.23
65	M 24	.75	.68	.75	.76	.68	.62	.81	.73
	SD	.32	.15	.31	.18	.32	.24	.33	.17
76	M 24	.52	.49	.82	.76	.70	.64	.82	.76
	SD	.13	.17	.22	.12	.26	.25	.19	.15

interaction could not be tested with data from the Kounin task. When tested with regard to placement accuracy on the four concepts in the MCAT, hypothesis

3 received no support whatever.

Hypothesis 4. Reinforcement conditions did not affect length of decision time. Nor did the hypothesized treatment-age interaction appear in the data. Thus, the fourth hypothesis, that tangibility of reward would lead to a greater deliberation over all age groups but would exert a diminishing influence with increasing age, was not supported. Age alone exerted a significant effect on decision times associated with only cylindrical blocks ($F = 7.6$; $df = 2, 66$; $p < .001$). Average (log) decision times for the three age groups were, respectively for the five, five and one half, and six and one-half-year-olds, .66, .72, and .51. The percents of accuracy associated with these decision times were, respectively, .64, .71, and .91.

Discussion

Age

Age was the only significant independent variable in the present study. Concept switching appears from the data in Table 2 to progress from a complete mystery at age five to at least a task to be attempted by five and a half years to a task capable of mastery by about half of the six and a half-year-olds of this population. This progression is undoubtedly associated with the shift from the representational process that Bruner (1964) has called "iconic" to the symbolic process described as inner speech by Vygotsky (1962) and investigated by Bruner and his colleagues (1966). The extent to which variables other than language influence the progression in concept switching is a matter for further empirical investigation.

The ability to attain a shape concept in the multiple-concept task appeared in strength among these children between five and a half

and six and a half years of age. The ability to attain a concept based on color was strong among the five year-olds and became somewhat weaker over the age range sampled. Height and the null concept remained almost at a chance level of accuracy throughout this age span. The decline in accuracy on the color concept over the age range sampled, coupled with the increase in shape accuracy, conforms with results of other studies (e.g., Suchman & Trabasso, 1966a). Results from experiments by Suchman and Trabasso (1966b) suggest color-form preference as a possible mediating mechanism for the dual pattern of accuracy in the shape and color concepts: ". . . if S's preferred dimension is relevant, performance is facilitated; if the preferred dimension is irrelevant, performance is retarded" (p. 192).

Results regarding the development of color and form preference among boys from western culture consistently point to color as a younger, and form as an older, predisposition and ability. This only puts the question off one step further, however. One still wants to know why this order of predisposition and ability develops. The question is made more intriguing by Suchman's (1966) finding that the sequence is quite different among West African youth, who maintain a color preference well into adolescence. A word of caution is in order about generalizing the findings of the present study regarding color-form dominance. They may hold true for boys only. Honkavaara (1958) and Kagan and Lemkin (1961) found sex differences in color-form predispositions of children in the age range from four to eleven years.

Patterns in Accuracy and Decision Time

The age shifts in accuracy of Table 3 form a pattern with age shifts in decision time of Table 4. As the shape concept becomes (in the cross-sectional sense, of course) easier, decision times become shorter. Those concepts (height and null) that are difficult throughout the age range are associated with decision times that remain high. As the color concept becomes more difficult over the age span, decision times increase.

This pattern of relations between level of accuracy and decision time holds its shape in considerable detail in the data of Tables 3 and 4. At age five the concept with the highest degree of mastery (Table 3) is the color concept under tangible conditions, an average percent of accuracy of .88. Turning to the comparable row of decision-time data for five-year-olds, in Table 4, the shortest average (log) decision time for that age, .56, is in the corresponding cell. Similarly, for ages five and one half and six and one half: the highest percent of accuracy in Table 3 is matched cell for cell with the lowest decision time in Table 4.

These patterns lend support to a conception of adaptive thinking, now being investigated, that holds thought to be adaptive only where information from the environment indicates that action is unsuccessful; where action is indicated to be successful, deliberation is maladaptive and quick action is adaptive. This conception, together with the foregoing empirical patterns of decision time and accuracy, calls into question the research strategy followed by Kagan (1965) that investigates individual differences in decision times only in the context of difficult tasks. Adequate knowledge of the function of deliberation can come only from its

observation in relation to action and to action consequences in their entire range from complete success to complete failure.

Effects of Reinforcement Conditions

The principal anticipations of the present study have been consistently negated in the data. Tangibility of reinforcement exerted no influence on cognitive behavior of several kinds: concept switching, concept attainment behavior, concept verbalization, and decision time. In this respect the present study replicates completely the results of the Cernius study, which was identical to the present study except for the age range of lower-class boys studied (six and a half to nine and a half years). The results of both the present study and that of Cernius fail to replicate the effects of the Zigler-de Labry and Terrell, et al. (1959) studies. One possible cause of the failure to replicate the findings of Zigler and de Labry or of Terrell, et al., is that the children may not have retained the intended association between the washers and the reward objects. This same procedure, however, was used by Nickell and Travers (1963), who included pre-kindergarten children and found a significant main effect of reinforcer. Recent results from the literature on social reinforcement may throw light on why we failed to replicate these earlier findings. A word of caution is in order, however, before applying the results of that literature to the present case of disconfirmation.

The literature on social reinforcement, reviewed by Stevenson (1967) and Parton and Ross (1965), is based on an amazingly narrow sample of tasks, virtually all of them of the motor-performance variety. The almost universally adopted task is the "Marble-in-the-Hole" task used by

Zigler and Kanzer (1962), Rosenhan and Greenwald (1965), McGrade (1966) and others. It requires the child to put marbles in one of two holes. The marble then traverses a trough and re-appears in a tray below the holes. The subject picks up the marble and again puts it into one of the two holes, and so on. The constraints of correctness or incorrectness, or of goodness or badness, of the child's response are determined by the experimenter. The game is usually played for 10 minutes: a 3-minute baseline period, where no reinforcement is given, but the child's preference is noted, and a 7-minute period of reinforcement for responses to the hole opposite to the one preferred by S in the 3-minute baseline period. The dependent variable of interest is a difference-in-rate score from baseline to reinforcement period.

Two characteristics of the Marble-in-the-Hole task and variants of it used by Stevenson (1961) or other performance tasks, e.g., Nickell and Travers (1963), distinguish such tasks from the Kounin concept switching task, the transposition task of Terrell, et al., (1959) or the MCAT. First, there is no objective information in the manipulanda of the social reinforcement studies that can be scrutinized by S as a basis for correctness of the response. The basis of correctness resides in the recesses of the experimenter's mind. The manipulanda used in the experiments on social reinforcement, marbles, have no stimulus characteristics relevant to success or failure in response. Second, and as a consequence of the first, the child is made completely dependent in the social situation of the experiment. It is obvious, therefore, that the child's task is to find out what the experimenter has in his mind. There is no other task. The apparatus and the marbles do not constitute any task except (a) as the subject creates

one or (b) as a means to find out the rule or idea that E has in mind.

In both the Kounin task and the MCAT matters are otherwise. The experimenter has, to be sure, created the world to which S is temporarily being subjected, but cues as to right conduct in that world are discoverable in the manipulanda. Once initial information is made available by E, extrapolations can be made with the aid of stimulus characteristics. It is important to note that these stimuli, unlike those in the marble games, have been created so as to emphasize the relevant stimulus properties.

Thus, children were not wholly dependent on E in the present experiment, in the Cernius experiment, and in the Zigler-de Labry experiment in a way that subjects are dependent in typical social reinforcement studies.[2] Furthermore, both the Kounin task and the MCAT are cognitively complex in comparison to the performance tasks of social reinforcement studies. The foregoing differences must be borne in mind as we consider some of the major outcomes of the social reinforcement literature.

The chief interest of investigators of social reinforcement is the effects of various kinds of interventions on E's part upon S's response as he plays the marble game. These interventions are appropriately called social reinforcements because they are verbal, because variations in the kinds of verbalization are derived from social considerations such as kinds of social background, and because the task, having supposedly been stripped of all cognitive components, creates a purely social situation without independent cognitive cues.[3]

The most frequently studied dimension of social reinforcement in recent years has been one that distinguishes between the person and the

task as referents of the reinforcing comment. Person-oriented comments are: that's good, fine, swell; you're good, etc. Task-oriented comments are: that's right, correct; you're right, etc.

Zigler and Kanzer (1962) published what has become the central study regarding differentiation of "praise" reinforcement from "correct" reinforcement. They found that middle-class eight-year-olds responded to the Marble-in-the-Hole game at a higher rate when reinforced with "right" and "correct" than when reinforced with "good" or "fine," but that lower-class children were more responsive to the personal or praise reinforcement than to the performance or "correct" reinforcement. There was no main effect of reinforcement across social classes, however.

Two experiments were run by Rosenhan and Greenwald (1965) in an attempt to replicate Zigler and Kanzer's finding that person reinforcers and performance reinforcers had opposite effects for middle and lower-class children. While combined data from the two experiments did show an over-all effect of type of reinforcer across social classes, there were no indications of an interaction of social class with reinforcer type. They also noted that their experimenters were considerably less effective as sources of reinforcement than was the experimenter in the Zigler-Kanzer study. They also pointout a finding by Dorwart, Ezerman, Lewis, and Rosenhan (1965): ". . . that seemingly trivial encounters between E and S, such as the amount and quality of pre-experimental contact between them, can massively influence E's subsequent effectiveness as a reinforcing agent" (Rosenhan & Greenwald, 1965: p. 117). Rosenhan and Greenwald also take note of research (Rosenthal, 1963) showing the effects of the experimenter's commitment to the validity of his hypotheses on the results of his study.

Bell (1965), reviewing child development research for 1963-64, comments on some of the sources of instability in social reinforcement data:

> This year in the interest of science and guidance thousands of children in classrooms all over the world were told by their teachers that someone wished them to perform some task or play a game. From the continuing research on anxiety and social deprivation we now know that the trip down the hall to an adjoining room is an important one for both the child and scientist. We also know that after the child arrives in the testing room some basic parameters come into play, such as the sex of the experimenter, and that these interact with the age and sex of the subject. . . A review paper by Rosenthal [1963a] on human subjects fits the developmental findings into the context of the larger problem of experimenter effects in psychology as a whole. The nadir in this field, however, is reached in a study on animals, a finding by Rosenthal & Fode [1963], that inexperienced laboratory assistants testing groups of rats which were actually similar but designated "maze bright" or "maze dull" produced differences appropriate to the designation. Would experienced assistants produce even greater differences? (p. 1)

In a study commendable for its methodological care McGrade (1966) attempted to replicate the Zigler-Kanzer interaction of reinforcer type

with social class. McGrade's study employed a control group, and thus avoided one of the pitfalls Parton and Ross (1965) found characteristic of research on social reinforcement; McGrade also employed an experimenter who was naive with respect to the purpose and hypotheses of the experiment. She failed to replicate the Zigler-Kanzer finding that social class interacted with type of reinforcer in performance on the marble game.

Reference must be made also to Stevenson's (1961) study of the effects of children's age and sex, and of experimenter's sex, on children's responsiveness to social reinforcement in a performance task. Results showed highly complicated interaction effects and no simple effects. Both male and female experimenters exerted individual, idiosyncratic effects on their subjects, and idiosyncratic effects that were differentiated for different ages and different sexes of the children. Thus, in complicated ways experimenters exerted idiosyncratic effects on performance with identical verbal reinforcements for all children.

Finally, Parton and De Nike (1966) studying the hypotheses about what made a right answer right that children developed during the marble game, found that the (person-oriented) reinforcers' effectiveness depended on whether the reinforcement was compatible with the child's hypothesis. Children who developed contingency hypotheses (e.g., "When I put it in this hole (pointing correctly), she would say, 'good'.") and who said they worked to receive praise responded significantly more correctly to the contingency E had established than other children. Those children who developed alternation hypotheses (e.g., "She would say those things when I put it in this hole and then in this one.") responded with significantly more alternation

responses than other children. It seems that children's idiosyncracies, too, exert a systematic and significant influence on their reponses in a performance task.

We turned to a review of these studies for a possible explanation of our failure to replicate the Zigler-de Labry and Terrell, et al., results. We found an embarrassment of riches. First, let us suppose that the Zigler-Kanzer finding, that lower-class children are relatively unresponsive to performance-oriented reinforcement, operated in our experiment. We used performance-oriented reinforcers in both of our reinforcement conditions in addition to the condition of delivery or non-delivery of the token. If children attended selectively to the verbal reinforcement instead of attending to the washers, the absence of any difference between the two experimental groups both in our study and in the Cernius study would be accounted for. In view of the active and selective role of children's mediating hypotheses shown by Parton and De Nike, this possibly is not remote.

But there is reason to doubt the stability and/or generality of the interaction between social class and social reinforcer found by Zigler and Kanzer. The causes for Rosenhan and Greenwald's and McGrade's failures to replicate the Zigler-Kanzer interaction are also possible causes for our failure to replicate the tangibility-intangibility findings of Zigler and de Labry and Terrell, et al. The causes are as numerous and their combinations as complicated as the second-order interactions found by Stevenson, which implicated unspecified idiosyncracies of the experimenter. The complication does not rest there. The possibility for a range of hypotheses developed by the child about what made for correct responses in our cognitive

tasks is certainly as great as it was shown to be in the Marble-in-the-Hole context by Parton and De Nike. Unfortunately, we have no data regarding our subjects' hypotheses. Since we have no data regarding variation in rapport between our experimenter and our subjects we cannot evaluate that possibility, suggested by the findings of Dorwart et al. We can acknowledge a somewhat positive bias at the outset of the study in favor of the greater effectiveness of tangible over intangible rewards but, since our results run counter to this bias, that may prove nothing but that there are individual differences in the effectiveness of experimenters in biasing their subjects' responses.

We are left with a wide range of alternative explanations for our (and Cernius', 1966) failure to replicate the social-class differences found in the Zigler-de Labry and Terrell, et al. studies, both of which employed cognitive tasks. We might have anticipated this outcome from the Stevenson (1961) study, but we did not. The literature since we began this study has borne out the complexities revealed in Stevenson's study. It may be that there are social-class differences in responsiveness to reinforcers, and that extraneous complications of the kinds we have discussed crept in to obscure those differences. It may also be the case that there are no such social-class differences in responsiveness and that the extraneous complications are in the Zigler-de Labry and Terrell, et al., studies.

One thing seems certain: psychologists have revealed in studies of social reinforcement a large family of variables that are at once potent and highly unstable. Those are certainly the makings of a rich

field of investigation. They are also the makings of woe for psychologists who must employ social reinforcers in order to study phenomena quite unrelated to social reinforcement per se.

Summary

Hypotheses regarding the tangibility-intangibility dimension of reinforcement were derived from social reinforcement theory and tested in a sample of lower-class boys. No effects of this dimension of reinforcement were found on four kinds of conceptual behavior: concept switching, concept attainment behavior, concept verbalization, and decision time. In this respect the study is a replication of an earlier study (Cernius, 1966) on lower-class boys from an older age range. Causes of the failure to confirm certain earlier studies were sought in reports of empirical studies from 1961 to 1967. Possible differences between earlier studies and the present study were found to be legion. Failure to replicate intriguing findings seems to be a characteristic of the extant literature on social reinforcement, a field whose potent but unstable variables challenge investigation.

Notes

1. The present study was an outgrowth of an earlier design which was originally proposed to the U.S. Office of Education. The original design called for a study of lower-class boys in grades one through four, and called for controls of test anxiety and defensiveness. By the time approval for that study had been granted by the Office, approximately six months after it was to have begun, the original study was almost completed. Among the alternatives open to us was an extension of the earlier study downward in age to the five year-old level. The present report presents findings of that downward extension. The original study was carried out as a doctoral study by the junior author and is on file at the Department of Education, The University of Chicago, 5835 South Kimbark Ave., Chicago, 60637. Research reported in this paper was supported by the Cooperative Research Program of the Office of Education, U.S. Department of Health, Education, and Welfare, Project No. S-283.

2. For an ingenious study focused on the consequences of complete dependence on E for cues compared to the relative autonomy provided by cues available in the stimuli, see Restle, Andrews & Rokeach (1964).

3. See Maccoby, Maccoby, Romney & Adams (1961) and related studies for data and theory relevant to a very different definition of "social reinforcement." The Maccoby, et al., conception of social reinforcement resembles Thelen's (1960, p. 116 and 138-139) description of psyche group functions following a confrontation.

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